REMARKS

In an Office Action mailed on April 15, 1004, Claims 3-5, 10-13 and 17-19 were allowed and Claim 36 was withdrawn from examination. The remaining claims were rejected in the Office Action. In particular, Claims 1, 2, 6 and 8 were rejected under 35 USC 102(b) over U.S. Patent No. 5,152,949 to Leoni ("Leoni"). Claims 1, 2, 6, 7 and 9 were rejected under 35 USC 102(b) over U.S. Patent No. 5,902,535 to Burgess et al. ("Burgess"). Claims 14, 16, 20 and 21 were rejected under 35 USC 103(a) over Leoni in combination with U.S. Patent No. 5,441,692 to Taricco ("Taricco").

Leoni discloses a rigid mold assembly **10** having a rigid mold subassembly **12** and a compliant mold subassembly **30**, as shown in Figure 1. The rigid mold subassembly includes a female mold **14** having resin injection ports **26**, one or more vents **28** and a cover plate **20**. The compliant subassembly includes a plurality of conformable cauls **32** and a liner **36**. The liner cooperates with the cover plate to define the vacuum chamber for impregnating resin into the composite. The conformable cauls are positioned adjacent the liner and can include a facing surface **34b** to accommodate rigid mandrels **42** "that provide structurally strengthened, indented surface areas in the finished composite article," as described at column 5, lines 67-68 and column 6, lines 1-2 of Leoni.

Taricco discloses a vacuum assisted resin transfer molding system **10** including an autoclave **12**, as shown in Figure 1. The autoclave includes a tank **14** that has an inner chamber **16** in which is placed a tool **24** having a fibrous sheet **26** (which is combined with resin to create a composite material) covered by a cover plate **28**. The cover plate may be constructed of a flexible nylon, as described at column 3, lines 8-9 of Taricco. Flexible joints **36** provide fluid communication between the inner cavity **30** and a pump system **32** located outside of the tank. The pump system can pressurize or create a vacuum in the inner cavity. During compression, resin flows out of the inner cavity via the flexible joints to the pump system.

Burgess discloses a molding tool **10** including an outer mold tool **12** having a facing sheet **14** along which a resin film **18** is positioned, as shown in Figure 1 of

Burgess. A preform assembly **20** having a plurality of stringers and intercoastals is positioned on the resin film. Positioned opposite the outer mold tool, and in engagement with the resin film, are a plurality of mandrels **32** of an inner mold tool **30**. Once assembled, these components are bagged, a vacuum is applied within the bag and the tool assembly is placed in an autoclave to melt and distribute the resin film.

In the Office Action, Claim 1 was rejected despite the added recitation in the previous Amendment (dated January 29, 2004) of a tight tolerance of within ±0.015 inches for the composite structure. In particular, it was alleged in the Office Action that the newly added limitation about the tight tolerance of the molded article is "intended use and does not materially distinguish the structure of the apparatus over Burgess et al." *See* page 5, paragraph 8 of the Office Action.

Claim 1 has been amended to describe the second mold line tool as having a hard interface with a tight tolerance of within ±0.015 inches. This tolerance at the hard interface of the second mold line tool is capable of producing the similarly tight tolerance in the composite structure. Burgess, Taricco, Leoni and the remaining cited references, alone and in combination, fail to teach or suggest a mold line tool with a hard interface having a tight tolerance of within ±0.015 inches that is capable of producing a composite structure with a tight tolerance. In addition, the recitation of the tolerance within ±0.015 inches applies to the mold line tool, and not to the composite structure, and is therefore not an "intended use." Applicant submits, therefore, that the rejection of independent Claim 1 under 35 USC 102(b) over Leoni and Burgess has been overcome and Claim 1 is therefore in a condition for allowance.

With respect to Claim 14, Leoni discloses fiber preforms having a fiber-to-resin ratio of 60% to 65%, but not resulting from a resin infusion apparatus having combined curing and pressure bleed capabilities. In particular, Leoni requires two pressure bleed steps at two different pressures, closure of bleed ports and then another step of curing in an autoclave to achieve its fiber-to-resin ratio. The autoclave of Leoni does not include

openings capable of allowing passage of a conduit to allow continued pressure bleeding during curing.

It was alleged in the Office Action that the simultaneous pressure bleed and curing recitation in Claim 14 need not be considered because it is an "intended use" and that this use is "not likely" because "it is clear to one of ordinary skill in the art that simultaneous curing and bleeding would significantly hinder the bleeding due to the increase in the viscosity of the resin during curing." *See* page 8, first paragraph of the Office Action.

With respect to the apparatus of Claim 14 describing an intended use, Claim 14 describes the conduit as passing through the chamber so as to enable the simultaneous pressure bleed. Passage of the conduit through an opening in the chamber, therefore, is a concrete limitation defining the assembly and enabling the simultaneous pressure bleed and curing. With respect to an inability to bleed the resin during curing, Applicant notes that Tarrico discloses heating using an autoclave to cure the composite material and use of a differential pressure to move the cover plate and push the resin out of the tool cavity. *See* column 1, lines 66-69 and column 2, lines 9-19 of Tarrico.

In Tarrico, however, the autoclave is used to exert a vacuum pressure on the tool and cover plate while resin is evacuated with a pump from a cavity defined within the tool and cover. Notably, in Tarrico, the vacuum pressure of the autoclave is a negative pressure on the outside of the tool and the vacuum pressure within the tool is also negative pressure. In addition, the vacuum pressure exerted within the tool and cover is described by Tarrico as being adjusted to track the pressure resulting from pumping the resin out of the tool and cover. These tracking, offsetting pressures allow the tool and cover plate to be constructed of a relatively thin material. "Reducing and increasing the inner chamber pressure of the autoclave to offset the inner pressure of the tool reduces the stresses on the tooling material and allows the tool and cover plate to be constructed of a relatively thin material." *See* column 1, line 68 and column 2, lines 1-5 of Tarrico.

Claim 14 has been amended to clarify that 1) the conduit is configured to apply a vacuum pressure within the bag, 2) the autoclave is configured to apply a positive pressure to the mold assembly and that 3) the bag is sufficiently thick to withstand simultaneously the internal vacuum pressure and the external positive pressure. In the present invention, the ability of the assembly to produce and handle these additive pressures allow production of the 53% or higher fiber volume composite in a single, combined step.

Tarrico teaches that having a thin tool and cover "reduces the weight and thermal capacitance of the tooling, thereby increasing the ease of operation and reducing the production cycle time of the resin transfer molding process." Tarrico, therefore, teaches against the present invention described in Claim 14 wherein the bag is sufficiently thick to withstand the additive pressures supplied by the conduit and the autoclave. Therefore, one of skill in the art would not be motivated to combine Tarrico with Leoni.

A combination of Tarrico and Leoni would still fail to teach Claim 14 of the present invention. Tarrico discloses a tool and cover plate that are too thin to withstand the additive pressures of a simultaneous curing and pressure bleed. In addition, it appears that applying sufficient simultaneous curing and bleeding pressures to Tarrico's tool and cover plate to achieve the fiber volumes taught by Leoni in a single step could result in the tool and cover plate of Tarrico collapsing.

Applicant could not find in Burgess and the remaining references a teaching or suggestion of a vacuum bag of a resin infusion apparatus that is thick enough to withstand a simultaneous cure and pressure bleed necessary to achieve at least a fiber volume of 53%. Therefore, the rejection of Claim 14 over Leoni and Tarrico under 35 USC 103(a) has been overcome. The remaining rejected Claims 2, 6-9, 16, 20 and 21 directly or indirectly depend from, and further patentably distinguish, independent Claims 1 and 14. The rejections of Claims 2, 6-9, 16, 20 and 21 under 35 USC 102(b) and 103(a) have therefore also been overcome.

A new Claim 37 has been added which depends from Claim 14 and describes the bag as being configured for encapsulation of up to 100 psi.

CONCLUSION

In view of the remarks and amendments presented above, it is respectfully submitted that claims of the present application are in condition for allowance. It is respectfully requested that a Notice of Allowance be issued in due course. The Examiner is requested to contact Applicants' undersigned attorney to resolve any remaining issues in order to expedite examination of the present application.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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CLT01/4657485v1